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published in
International Journal of Tourism Policy
2014

DOI (link to publisher)
10.1504/ijtp.2014.063105

document version
Early version, also known as pre-print

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Abstract: Tourism is one of the major drivers of the Greek economy. The contribution of tourism to the Greek economy has proved especially relevant during the period of the credit and euro crises with a high budgetary and balance of payment deficits. From that perspective, this study examines the impact of the socio-economic and geographical determinants of foreign tourism demand in Greece. For the empirical analysis, a panel dataset of 31 countries is used over the period 2001–2010. The panel data estimation indicates that distance and trade have more explanatory power than relative prices and other determinants such as transport infrastructure. Income is statistically significant in three out of the eight specifications. Also, political stability seems to play an important role in tourism demand. The results are mixed for the competitive prices between Greece and its main tourism competitors. An interesting finding is that the Olympic Games of 2004 seem to have had a negative impact on international tourist arrivals in Greece in that year.

Keywords: tourism demand; Greece; gravity model; panel data analysis; system GMM.

Reference to this paper should be made as follows: Chasapopoulos, P., den Butter, F.A.G. and Mihaylov, E. (xxxx) 'Demand for tourism in Greece: a panel data analysis using the gravity model', *Int. J. Tourism Policy*, Vol. X, No. Y, pp.000–000.

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1 Introduction

Tourism is one of the major industries in Greece, which contributes to the economic welfare of the country. The income generated by direct travel and tourism industries plus the indirect and induced contributions account for 16.5% of gross domestic product (GDP) and 18.4% of total employment in Greece (WTTC, 2011). Furthermore, receipts from tourism activity contribute to finance part of the current account deficit of the balance of payments. In the period 2000–2011, the surplus on the tourism account amounted to 4% of GDP, on average, whereas the total deficit of the current account was 9.5% of GDP.

The ongoing global financial crisis of 2007 and the consequent debt crisis had an important impact on the Greek economy affecting the tourism sector as well. Both the number of tourist arrivals and tourism receipts declined after 2007, capturing the consequences of the country's abnormal economic and social environment. Yet, in 2011, the main tourist indicators showed a substantial improvement allowing the policy makers to be more optimistic and believe that tourism could play an important role to alleviate the financial and debt problems and boost Greece's economic recovery.

Given the important role of the tourism industry in Greece, and given the perspective of the credit and debt crisis, this paper examines empirically the factors that influence the international demand for tourist services in Greece. The analysis is based on a panel dataset of 31 countries, which constitute nearly 90% of the total tourism demand in Greece during the period 2001–2010. The demand for tourism is estimated using gravity

equations taking the number of tourist arrivals as a dependent variable. In comparison with previous empirical studies of international tourist flows to Greece (Lathiras and Siriopoulos, 1998; Dritsakis and Athanasiadis, 2000; Louvieris, 2002; Dritsakis, 2004), this paper differs in that it utilises a larger dataset, includes more countries and uses additional explanatory variables. A second contribution of this study is that we elaborate on the previous literature by considering not only the relative prices but also the comparative price levels (CPLs) in the analysis of foreign tourist demand. This is done in order to capture differences in the cost of living between destination and origin countries.

The empirical results show that trade and distance between Greece and the tourist generating countries are the main factors explaining tourist flows to Greece. The political stability in the country as well as the relative price levels between Greece and competing tourist destinations, such as Turkey, Cyprus and Egypt, are also found to significantly influence tourist arrivals in Greece. Tourists' personal income, infrastructure and relative prices between Greece and tourism generating countries are less important factors in explaining the tourism demand. Interestingly, the 2004 Olympic Games in Athens had a negative impact on tourist flows to Greece.

The rest of this paper is organised as follows. The next section surveys the literature on international tourism demand and gives a brief discussion of the factors affecting foreign tourism. The model and the variables used in the empirical analysis are specified in Section 3. Section 4 discusses the estimation method and presents the results. Finally, the last section concludes and discusses the implications for tourism policy in Greece.

2 Demand for tourism: a survey of the literature

2.1 Measuring tourist demand

Empirical analyses of the demand for tourism generally take the theory of consumer demand as a starting point. A demand function of the type $Q = f(X)$ is specified, where Q is the tourism demand and X is a vector of explanatory variables such as income, distance and price levels that explain Q. Song and Witt (2000), and Proenca and Soukiazis (2005) consider tourism demand as the aggregate amount of a set of tourist products and services that the visitors are willing to buy during the period of their vacation.

The literature distinguishes three main ways to measure foreign demand for tourism. The first way is to take the total number of arrivals of non-resident tourists at national borders as measure for tourism demand (see Akis, 1998; Stucka, 2002; Naude and Saayman, 2005; Phakdisoth and Kim, 2007). Garín-Muñoz (2006), and Dritsakis and Athanasiadis (2000) use tourist arrivals per capita to capture the volume of tourism in Canary Islands and Greece, respectively. Leitao (2010) measures the demand for tourism using the number of visitors staying in hotels.

As the entrance of travellers from each origination does not take into account their stay-duration, a second way to measure tourism demand is to consider the number of nights spent by tourists in the destination country. In a study of international tourist flows to Spain, Garín-Muñoz and Amaral (2000) use the number of per capita overnight stays in hotels by each tourist generating country as a measure of tourism demand. In a similar way, Athanasopoulos and Hyndman (2008) model the Australian domestic tourism demand. A shortcoming of this approach is that it excludes a considerable number of

tourists – those who stay in their own accommodations or are hosted by family and friends.

Both tourist arrivals and overnight stays define foreign demands for tourist services without considering the consumption behaviour of visitors. For this reason, some studies apply, as a third way of measurement, the total expenditures made by foreign tourists as a proxy for tourism demand (see Loeb, 1982; González and Moral, 1995; Tse, 2001). De Mello et al. (2002) define tourist demand in the UK as the share of tourism expenditures of the sending country to alternative destinations. Proenca and Soukiazis (2005) estimate the demand for tourism in Portugal as the share of the spending of each origin country to the total tourism expenditures in the destination country.

Ideally, one would want to measure foreign tourism demand by a combination of the three approaches mentioned above. In reality, however, this appears unfeasible due to the great complexity involved in constructing data for such a variable. Furthermore, data on tourism expenditure are rarely available. Song and Li (2008), and Lim (1997), who carried out a review of more than 100 empirical studies of international tourism, conclude that the total number of tourist arrivals remains the most commonly used method for measuring tourism demand. The present study follows this strand of literature.

2.2 Determinants of foreign tourism demand

Early empirical studies on tourism demand underline the importance of visitors' purchasing power for the demand of international tourism services (Gray, 1966; Kwack, 1972; Loeb, 1982). Also in more recent studies (Garín-Muñoz and Amaral, 2000; Song et al., 2003a; Leitao, 2010), income is found to have a strong explanatory power in the tourism demand function. Higher income leads to more demand for tourism services. According to Garín-Muñoz (2006), Proenca and Soukiazis (2005) and Ledesma-Rodrıguez et al. (2001), tourism is a luxury good as its share in consumption spending increases more than proportionally when real income rises. That is, the income elasticity of demand exceeds unity. On the other hand, Phakdisoth and Kim (2007) and Habibi et al. (2009) find that tourist flows to Laos and Malaysia, respectively, are inelastic and hence not regarded by travellers as a luxury good. This suggests that income elasticity of tourism demand is country specific and no generalisation can be made about its value.

Apart from income, prices are another dominant factor that is found to influence the international tourism demand (see Gray, 1966; Kwack, 1972; Loeb, 1982; González and Moral, 1995; Song et al., 2003b). According to Walsh (1996), the price of tourism includes three basic components: transportation costs, exchange rate costs and costs of living in the destination country. While kilometric distance between countries is usually employed as a proxy for transportation costs (Khadaroo and Seetanah, 2008; Archibald et al., 2008; Görmüs and Göçer, 2010), the influence of price changes on international travel is far more complex. The consumer price index (CPI) is widely used as an indicator for the tourists' cost of living in the holiday destination (Martin and Witt, 1987; Morley, 1994). Most empirical studies use the ratio of destination and tourist generating CPIs adjusted by the exchange rate to measure the differences between countries' price levels (see Dritsakis, 2004; Garín-Muñoz and Montero-Martin, 2007). Furthermore, Song et al. (2003a, 2003b) use a substitute price variable while Görmüs and Göçer (2010) employ the ratio of CPIs in the destination and alternative tourist competing countries in order to capture substitution price effects.

Many other factors may affect the demand for international tourism, such as the population of the tourist generating countries and trade relations between the countries. The population size of the sending country can be an important factor, since a rise in the number of people living in the origin countries will increase the potential consumers of the tourist services. Additionally, strong trade ties between host and origin countries may translate into advanced transport connections and higher promotion of the tourist product, facilitating travellers' flows between trade partners (see Eilat and Einav, 2004; Phakdisoth and Kim, 2007; Leitao, 2010).

Other factors that influence the choice of a holiday destination are the weather and climate. Lise and Tol (2002), and Martin (2005) investigate the effect of these factors on foreign tourism demand and find that their importance is significant. Furthermore, Seddighi et al. (2001) and Neumayer (2004) emphasise the importance of political instability and violence for the international demand of tourism.

Additionally, infrastructure in the destination country and other factors related to transportation and communication, which make the daily life of visitors more convenient, may also explain a part of the tourism demand (see Khadaroo and Seetanah, 2008; Archibald et al., 2008; Pulina and Biagi, 2010). Finally, negative shocks caused by (civil) wars, natural disasters, epidemic diseases and financial crises will have a substantial influence on tourism demand.

3 Data source and model specification

3.1 The gravity model

Our empirical analysis of tourist flows to Greece uses a gravity model. The gravity model traces its origins to the Newton's law of gravitation, which states that attraction between any two objects is proportional to their masses and inversely proportional to the distance between them. The general specification of the gravity model reads:

$$F_{i,j} = G\frac{m_i m_j}{d_{i,j}^2} \tag{1}$$

where F is the gravitational force between any two objects i and j; m_i and m_j are the masses of these two objects, respectively, and d is the distance between them. The term G refers to a universal gravitational constant.

The gravity model was introduced into international trade by Tinbergen (1962). He used the model to predict bilateral trade flows between countries on the hand of countries' economic sizes and the distance between them. Since its introduction in economics, the gravity model has become a common tool for the analysis of trade flows.[1]

Rewriting equation (1) in logarithmic form and in terms of tourist flows gives:

$$\ln Y_{i,t} = \alpha + \mu_i + \beta \ln X'_{i,t} + \varepsilon_{i,t} \tag{2}$$

where Y stands for international demand for tourist services in Greece; X' is a vector of variables explaining the Greek tourism demand; μ refers to unobservable country-specific effects; α is an intercept and ε is the idiosyncratic error term that is uncorrelated with μ. The terms i and t indicate, respectively, tourism generating country and year of observation.

The estimation of equation (2) is based on a panel dataset covering 31 countries[2], which constitute nearly 90% of the total tourism demand in Greece. The analysis uses annual data over the period 2001–2010. Since Greece is mainly a summer holiday destination, annual data are preferred in order to avoid seasonality problems.

3.2 Model variables

3.2.1 The dependent variable

The dependent variable, $Y_{i,t}$, is measured by the total non-resident tourist arrivals to Greece from country i in year t. As discussed before, this analysis uses the number of tourist arrivals since it appears the best way of to measure tourism demand, given the available data. The data for tourist arrivals come from the World Tourism Organization (UNWTO) and cover the period 2001–2010.

The vector X' includes a number of explanatory variables which are expected to influence the international demand for Greek tourist services.

3.2.2 Real personal income

The most important determinant of tourists' decision to travel abroad is the level of their personal income. It is approximated in this analysis by GDP per capita of the origin countries.[3] GDP is measured in constant 2005 Purchasing Power Parities. The income elasticity of tourism demand is expected to be positive. The GDP data are taken from the World Bank's World Development Indicators and cover the years 2001–2010.

3.2.3 Relative and competitive prices

The cost of living in the destination country is another factor that may influence the international tourism demand. For this reason, we use a proxy of relative prices between Greece and the tourist generating countries. It is a general practice in empirical research to calculate relative prices as the ratio of the CPIs of the destination and the sending countries, adjusted by the exchange rate (see Martin and Witt, 1987; Morley, 1994; Proenca and Soukiazis, 2005; Aslan et al., 2009).

Even though this measure of relative prices is commonly accepted and widely used in the literature, it has one main limitation. The ratio of CPIs captures relative price levels changes across countries, but it does not say anything about the level of prices. In order to account for this limitation, we apply two alternative approaches in measuring relative prices.

Firstly, following the previous literature we calculate the relative prices as:

$$RP_{i,t} = \frac{CPI_{GR,t}}{CPI_{i,t}EX_{i,t}} \tag{3}$$

where $CPI_{GR,t}$ and $CPI_{i,t}$ are the CPI of Greece and the origin country, respectively, and $EX_{i,t}$ is the exchange rate between Greece and the origin country.

Secondly, we use an alternative measure of relative prices, whereby relative prices are defined as the ratio of CPLs between Greece and the tourist generating countries. The results of this second approach are reported in the sensitivity analysis.

Additionally, there is also another type of relative prices that should be taken into account as determinant of foreign tourism demand, namely that between Greece and its main competitors as holiday destinations. These competitive prices are defined as the ratio of the Greek CPI to the CPI of the competing destinations. According to the Association of Greek Tourism Enterprises, the main competitors of the Greek tourist product are Spain, Turkey, Croatia, Egypt, and Cyprus due to their geographical and cultural similarities with Greece. In this analysis, we consider also Portugal and Italy as competing countries. A decrease in the price level of Greece relative to the sending countries or to the alternative destinations would be an incentive for more tourists to visit Greece. Therefore, a negative sign for both relative and competitive prices is expected. These relative price indices are constructed using data on prices and exchange rates which are extracted from the financial statistics of the International Monetary Fund (IMF) and the European Central Bank, respectively.

3.2.4 Trade ties

As discussed, bilateral trade relationships may also facilitate the tourist flows between countries. Trade can serve as an informational knowledge platform between Greece and the origin countries. Following Phakdisoth and Kim (2007) and Leitao (2010), the trade value between Greece and each of the origin countries is calculated as follows:

$$TRV_{i,t} = \frac{X_{i,t} + M_{i,t}}{GDP_{GR,t} + GDP_{i,t}} \tag{4}$$

where $X_{i,t}$ refers to the annual exports of Greece to each tourist generating country; $M_{i,t}$ represents the annual imports of Greece from each origin country; $GDP_{GR,t}$ and $GDP_{i,t}$ stand, respectively, for GDP per capita of Greece and the tourist generating country. GDP per capita is measured in PPP and come from the World Bank. The value of imports and exports is extracted from the trade statistics of IMF.

3.2.5 Distance

The transportation cost is another aspect that can influence the tourists' decision of whether or not to visit Greece. The variable to capture the cost of travel to Greece in this paper is the kilometric distance between Athens and the capitals of all tourist generating countries. Despite its shortcoming as a measure of travel prices, distance is widely used in the literature as an effective proxy for transportation costs. We expect a negative sign for the coefficient of this variable. The data is taken from the CEPII (French Institute for Research on the World Economy) distance database.

3.2.6 Political stability

The global financial crisis that erupted in 2007 further deteriorated the already problematic macroeconomic fundamentals of the Greek economy and had serious impacts on the political stability of the country. The general strikes and mass demonstrations, accompanied often by violent riots, as well as the repeated national elections are considered to have a negative effect on international tourist arrivals. In order to control for the effect of political stability on tourist arrivals, we employ the World Bank's governance indicator of Political Stability and Absence of Violence. The

indicator measures the perceptions of the likelihood that the government will be destabilised or overthrown by unconstitutional or violent means, including domestic violence and terrorism. The decrease in this indicator in the years after 2007 confirms the political instability of the country. Hence, we expect a positive sign for this variable (see Naude and Saayman, 2005; Kareem, 2009).

3.2.7 Other supply factors

Aside from political stability there are also other supply conditions in the destination country that affect foreign tourist demand. Examples include infrastructure facilities such as airports, public transportation, telecommunication and other informational services. The sufficient provision of infrastructure and travel facilities makes the daily life of tourists more comfortable and safe, and thus influences the tourists' holiday destination choice. In other words, it reduces the transaction costs of tourists when travelling. In order to measure the effect of supply services on foreign tourism demand, the analysis employs the *gross investment spending in infrastructure* (*GISI*) as a proxy. Due to data availability, we focus specifically on transport infrastructure, which is arguably the most important type of infrastructure for tourists. GISI is a composite indicator. It is calculated as a sum of gross investment spending in airports infrastructure, roads and rail-roads infrastructure and sea ports infrastructure. This variable is applied with a one year lag in order to account for time lags associated with the realisation of long-term investments, such as the construction of motorways etcetera. The data are extracted from OECD Statistics and are measured in million Euros. The data for this variable cover the period 2001–2008.

3.2.8 Dummy variable

Finally, we include in the vector X' a dummy variable for the 2004 Olympic Games which took place in Athens. The Olympic Games are a popular sport event which attracts innumerable visitors from all over the world. We expect a positive sign for this variable. Table 1 summarises the variables and the data sources used to estimate equation (2).

Table 1 Overview variables and data sources

Variables	*Definition*	*Data source*
$TA_{i,t}$	Number of tourist arrivals from origin country i to Greece at time t	World Tourism Organization
$GDP_{i,t}$	GDP per capita of sending country i at time t	World Bank's WDI
$TRV_{i,t}$	Trade value between Greece and each origin country i at time t	Calculated IMF data, DOTS
Dis_i	Distance between Greece and each tourist generating country i	CEPII
$RP_{i,t}$	Relative price level between Greece and origin country i at time t	Calculated IMF data, IFS
$CPSPA_t$	Competitive price level between Greece and Spain at time t	Calculated IMF data, IFS

Table 1 Overview variables and data sources (continued)

Variables	*Definition*	*Data source*
$CPPOR_t$	Competitive price level between Greece and Portugal at time *t*	Calculated IMF data, IFS
$CPTUR_t$	Competitive price level between Greece and Turkey at time *t*	Calculated IMF data, IFS
$CPCYP_t$	Competitive price level between Greece and Cyprus at time *t*	Calculated IMF data, IFS
$CPEGY_t$	Competitive price level between Greece and Egypt at time *t*	Calculated IMF data, IFS
$CPCRO_t$	Competitive price level between Greece and Croatia at time *t*	Calculated IMF data, IFS
$CPITA_t$	Competitive price level between Greece and Italy at time *t*	Calculated IMF data, IFS
$PolSt_t$	Indicator of political stability in Greece in year *t*	World Bank's WGI
$GISI_{t-1}$	Gross investment spending in transport infrastructure (airports, roads, rail-roads and sea ports) in *t*–1	OECD Statistics
D2004	Dummy variable for the Olympic Games in Athens in 2004	Self-elaborated
$COMPR_{i,t}$	Comparative price levels between Greece and tourist generating country *i* at time *t*	OECD/Eurostat/PennWorldTable

4 Estimation of international tourism demand in Greece

4.1 Dynamic estimation

The panel structure of our data allows us to estimate equation (2) using panel data methods. Panel methods have an advantage over cross-sectional methods, as they make it possible to account for unobserved country-specific effects which may influence foreign tourism demand, such as climate, weather, cultural and historic heritage, hospitality of the destination country, historic ties between origin and destination countries etcetera. Most of these factors are difficult to include explicitly in the analysis, as they are not observed in the data. Assuming these factors are country-specific and time-invariant, one way to account for them is to employ panel data estimation techniques.

Equation (2) can be estimated using both static and dynamic panel methods. In this analysis, a dynamic estimation is applied in order to account for econometric problems (associated with static estimation) such as autocorrelation, unit roots and endogeneity.[4] Furthermore, the dynamic approach of tourism demand allows us to distinguish between short-term and long-term effects, as recognition lags are explicitly included in the specification by a lagged dependent variable. Rewriting equation (2) in a dynamic form yields:

$$\begin{aligned}\ln TA_{i,t} = {} & \alpha + \mu_i + \beta_1 \ln TA_{i,t-1} + \beta_2 \ln GDP_{i,t} + \beta_3 \ln TRV_{i,t} \\ & + \beta_4 \ln Dis_{i,t} + \beta_5 \ln RP_{i,t} + \varepsilon_{i,t}\end{aligned} \tag{5}$$

where $TA_{i,t-1}$ is the lagged dependent variable.

The error term $\varepsilon_{i,t}$ is now correlated with the lagged dependent variable, making the static estimation techniques (i.e., fixed and random effects) inappropriate, since the estimation results they provide would be biased and inconsistent. A way to overcome this problem is to find a valid instrument for the lagged value of dependent variable. The solution provided by Arellano and Bond (1991) is the *difference* generalised method of moment (GMM) estimation procedure (see Garín-Muñoz, 2006; Phakdisoth and Kim, 2007).[5] The authors argue that lagging the lagged dependent variable by two or more periods provides a valid instrument for this variable. Rewriting equation (5) in terms of differences yields:

$$\begin{aligned}\Delta \ln TA_{i,t} = {} & \beta_1 \Delta \ln TA_{i,t-1} + \beta_2 \Delta \ln GDP_{i,t} + \beta_3 \Delta \ln TRV_{i,t} \\ & + \beta_4 \Delta \ln Dis_{i,t} + \beta_5 \Delta \ln RP_{i,t} + \Delta \varepsilon_{i,t}\end{aligned} \tag{6}$$

where $\Delta \ln TA_{i,t} = TA_{i,t} - TA_{i,t-1}$ and similarly for the rest of the variables.

An advantage of this method is that the first-differencing procedure eliminates the unobserved country-specific effects μ_i. Moreover, by first-differencing all variables the possible presence of non-stationarity is removed. A problem arises with the use of Arellano and Bond's (1991) *difference* estimator when the lagged values of the explanatory variables turn to be weak instruments for the instrumented endogenous variables, especially when the variables follow a random walk.

For this reason, the present study employs the *system* GMM estimator outlined by Arellano and Bover (1995) and developed by Blundell and Bond (1998) (see Leitao, 2010). Using the *system* GMM estimator, we obtain a system of two equations, the original equation in levels and a differenced one. In this way, additional instruments can be used to increase efficiency, while the variables in levels are instrumented with their own first differences.[6] An assumption required in this case is that first-differenced instruments are uncorrelated with the unobserved country-specific effects.

The dynamic estimation with a lagged dependent variable can be interpreted as a distributed lag, representing partial adjustment or adaptive expectations mechanisms. The log-linear specification allows us to interpret the estimated coefficients as short-run elasticities. In order to calculate the long-run elasticities each coefficient has to be multiplied by the recognition lag: $1/(1 - \beta_1)$.

4.2 Estimation results of dynamic model

Table 2 reports the empirical results from the estimation of equation (6) applying the GMM-system estimator. The eight columns in the table refer to eight different specifications of the tourism demand function. Model (1) is our basic specification. In this model foreign income, trade relations, distance and prices are used to explain the international demand for Greek tourism services. Models (2) to (7) extend the basic model by including one or more additional determinants of foreign tourism demand. Moreover, this procedure serves as a robustness check for our baseline results. The sensitivity of the estimated results is further scrutinised in model (8), where we employ a different measure of relative prices. Model (8) is separately discussed in the next-subsection.

Table 2 Estimation results of GMM-system estimator

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
Constant	2.38 (1.82)	1.55 (1.22)	4.33 (2.03)	3.99 (2.74)	3.04 (2.38)	0.80 (0.39)	2.92 (2.30)	0.62 (0.29)
$lnTA_{t-1}$	0.78 (13.58)***	0.81 (14.38)***	0.75 (8.25)***	0.78 (9.76)***	0.74 (14.27)***	0.78 (12.71)***	0.74 (13.21)***	0.80 (16.81)***
lnGDP	0.21 {0.95} (1.74)*	0.17 {0.89} (1.53)	0.17 {0.68} (1.50)	0.10 {0.45} (0.81)	0.22 {0.84} (1.66)*	0.21 {0.95} (1.56)	0.22 {0.85} (1.59)	0.33 {1.65} (1.70)*
lnTRV	0.12 {0.54} (2.71)***	0.10 {0.52} (2.64)***	0.14 {0.56} (2.45)**	0.12 {0.54} (2.02)**	0.14 {0.54} (3.01)***	0.12 {0.54} (2.51)**	0.14 {0.54} (2.50)**	0.12 {0.60} (2.89)***
lnDis	–0.16 {–0.72} (–2.09)**	–0.13 {–0.68} (–1.82)*	–0.15 {–0.60} (–1.77)*	–0.12 {–0.54} (–1.47)	–0.18 {–0.69} (–2.03)**	–0.17 {–0.77} (–1.99)**	–0.18 {–0.69} (–2.18)**	–0.15 {–0.75} (–2.20)**
lnRP	–0.008 {–0.04} (–0.23)	–0.010 {–0.05} (–0.31)	0.014 {–0.06} (–0.36)	–0.021 {–0.09} (–0.57)	–0.011 {–0.04} (–0.27)	–0.009 {–0.04} (–0.24)	–0.010 {–0.04} (–0.25)	-
lnPolSt		0.13 {0.68} (2.43)**						
$lnGISI_{t-1}$			0.16 {–0.64} (–1.61)					
lnCPTUR				–0.85 {–3.86} (–2.39)**				
lnCPCYP				–0.32 {–1.45} (–3.24)***				
lnCPEGY				–0.29 {–1.31} (–2.18)***				

Notes: Dependent variable – number of tourist arrivals. All variables are converted in their logarithmic form (except the dummy variable for Olympic Games). T-values are presented in ( ), P-values of the respective tests reported in [ ], long-run elasticities in { }. Statistical significance at 10%, 5% and 1% indicated by *, ** and ***, respectively. AR(2) is Arellano and Bond test for second-order autocorrelation which has a null hypothesis of no second-order serial correlation it the residuals. Hansen test of overidentifying restrictions tests the null hypothesis of exogeneity of the instrumental variables. F test of the joint significance of the explanatory variables tests the null hypothesis that the estimated coefficients are jointly equal to zero. In all eight specifications, $lnTA_{t-1}$ and lnGDP variables are considered as endogenous.

Table 2 Estimation results of GMM-system estimator (continued)

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
lnCPSPA					0.79 {3.04} (0.28)			
lnCPOR					–0.17 {–0.65} (–0.13)			
lnCPCRO						0.82 {3.72} (1.02)		
lnCPITA						0.52 {2.36} (0.73)		
Dum2004							–0.14 {–0.54} (–1.73)*	
lnCOMPR								0.15 {0.75} (0.70)
AR(2)	0.35 [0.726]	0.40 [0.688]	0.78 [0.435]	0.80 [0.423]	0.34 [0.736]	0.33 [0.739]	0.68 [0.498]	0.39 [0.695]
Hansen test (d.f.)	29.56 (28) [0.384]	29.47 (28) [0.389]	26.60 (20) [0.147]	24.53 (28) [0.654]	29.48 (28) [0.388]	28.86 (28) [0.420]	29.73 (28) [0.376]	30.23 (28) [0.352]
F test (d.f.)	126.09 (5.30) [0.000]	138.40 (6.30) [0.000]	74.97 (6.30) [0.000]	84.47 (6.30) [0.000]	106.49 (7.30) [0.000]	140.23 (7.30) [0.000]	129.72 (6.30) [0.000]	177.02 (5.30) [0.000]
Number of instruments	34	35	27	37	36	36	35	34
Number of groups	31	31	31	31	31	31	31	31
Observations	*279*	*279*	*217*	*279*	*279*	*279*	*279*	*279*

Notes: Dependent variable – number of tourist arrivals. All variables are converted in their logarithmic form (except the dummy variable for Olympic Games). T-values are presented in ( ), P-values of the respective tests reported in [ ], long-run elasticities in { }. Statistical significance at 10%, 5% and 1% indicated by *, ** and ***, respectively. AR(2) is Arellano and Bond test for second-order autocorrelation which has a null hypothesis of no second-order serial correlation it the residuals. Hansen test of overidentifying restrictions tests the null hypothesis of exogeneity of the instrumental variables. F test of the joint significance of the explanatory variables tests the null hypothesis that the estimated coefficients are jointly equal to zero. In all eight specifications, $lnTA_{t-1}$ and lnGDP variables are considered as endogenous.

Model (1) shows that the demand for Greek tourism services is positively affected by foreign income and trade between Greece and the origin countries, and negatively affected by the distance between Greece and the sending countries. The coefficient value of the lagged dependent variable suggests a substantial recognition lag of almost 4.5 years for tourists visiting Greece. Further, the estimation results show that an increase in the personal income of tourists by 1% will have a positive effect on tourism demand increasing it by 0.21 and 0.95% in the short-run and long-run, respectively. Considering that tourism is a consumer product, it is in line with consumer theory that a rise of income leads to more demand for this product. When income rises people are willing to acquire more of this product. The fact that both income elasticities are lower than unity suggests that tourist services in Greece are not considered as a luxury good. However, the disposable income of tourists does not appear statistically significant in each model that we estimate. It is interesting to see how this result compares to other empirical studies that attempt to capture the effect of tourists' income. The empirical literature shows mixed results when it comes to the power of foreign income. Dritsakis and Athanasiadis (2000) estimate the demand functions for each of the main tourist generating countries to Greece. The empirical results show that foreign income is not as an important determinant of tourist arrivals as it would be expected according to the theory. Moreover, another study of Dritsakis and Gialitaki (2004) found that the real income of travellers has a positive and profound impact on tourist arrivals from USA to Greece. On the other hand, examining the German and British tourism demand in Greece, Dritsakis (2004) receives statistically significant coefficients for the income variable although with a negative sign. The author explains that tourists with higher income may prefer an alternative holiday destination to Greece.

Also, the trade flows between Greece and tourist generating countries are found to significantly affect the demand for tourism. The export and consumption of Greek products abroad is just another way for foreign residents to 'discover' Greece as a potential holiday destination. Trade reduces the cultural distance between countries, making residents of one country more willing to visit another country. The estimation results in model (1) show that an increase in trade flows by 1% will result, on average, in 0.12% additional foreign visitors to Greece in the short-run and 0.54 in the long-run. Distance, on the other hand, works in the opposite direction as countries further apart send on average fewer tourists to Greece. This is a logical result, because distance acts in this case as an indicator of transportation costs, or more broadly, of transaction costs. All else being equal, the higher the transportation costs are, the less likely people will be to undertake the journey and visit the country in question.

Finally, the relative prices are found to have a zero effect on tourism. Although the coefficient has the expected negative sign, it is not statistically different from zero, indicating that relative prices appear not to have a substantial impact on tourist arrivals. This can be explained by the fact that the main customers of Greek tourist product are countries with relatively high standards of living. Therefore, the decision to visit Greece is determined by the level of personal income rather than by the relative cost of living.

Model (2) extends the basic specification by including one additional variable measuring political stability and absence of violence in Greece. The coefficient of this variable has a positive sign, albeit statistically insignificant at 5% level. This suggests that the political instability and social unrest in Greece have a negative short-run impact

on the international tourism demand, while this effect is even more harmful in the long-run.

The estimated results in model (3) show that gross investment spending in transport infrastructure does not appear to have a beneficial impact on tourist arrivals. One possible explanation for this result is that the impact of infrastructure on tourism is captured to some extent by the country specific effects.

Models (4) to (6) consider the effect of the relative prices between Greece and alternative holiday destinations on the demand for Greek tourism services. We distinguish three groups of major tourist competitors of Greece. The distinction is based on geographical and cultural similarities between Greece and these competitors. The estimated results show that the competitive prices between Greece and Turkey, Cyprus and Egypt have a negative and significant impact on tourist flows to Greece. An increase in the price ratio between Greece and these countries will result in a drop in tourist arrivals to Greece. This effect is even stronger in the long-run than in the short-run, as it is shown by the estimated coefficients. All else being equal, consumers (who behave rationally and possess full information) will be more likely to visit the destination that offers the same services at lower prices.

It seems that the seaside resorts of Cyprus and the low priced tourist services in Turkey attract a considerable number of tourists during the summer months, affecting negatively the demand for tourist services in Greece. Moreover, the low tourists' cost of living in Egypt in combination with the warm climate in the coastal regions and its distinct cultural identity, make the country one of the main tourist competitors of Greece. The competitor price levels seem to play a minor role in the cases of Spain, Portugal, Italy and Croatia as all four coefficients are not statistically significant.

Model (7) includes a dummy variable for the 2004 Olympic Games in Athens. Contrary to the expectations, the coefficient of this variable has a negative sign and it is significant at the 10% level. One possible explanation for this result could be that tourists who otherwise would have visited Greece decided to visit another country, fearing higher prices, overcrowded conditions or even lack of adequate security measures in Greece during the summer of the Olympic Games. It is interesting to note that a similar negative effect was found for the recent Olympic Games in London. In the summer of 2012, the UK's capital experienced a dramatic drop of nearly 30% in tourist arrivals as compared to previous years (European Tour Operators Association, 2012). Examining the impact of the Olympic Games on international tourism flows, Garín-Muñoz and Amaral (2000) found that the 1992 Olympic Games in Barcelona had an insignificant effect on the demand for tourist services in Spain.

Finally, Table 2 presents Arellano and Bond second-order autocorrelation test (AR(2))[7] as well as Hansen tests of overidentifying restrictions. The tests do not detect any serial correlation in the residuals and confirm the validity of the instruments, respectively. These test statistics indicate that our econometric methodology is justified.

4.3 A sensitivity analysis on price effects

This study utilises the relative prices between Greece and the sending countries to capture differences in tourists' cost of living. This is in line with the literature on international tourism demand. However, a drawback of the relative prices, as defined here, is that they do not provide any information about how expensive tourist generating countries are

relative to Greece. The relative prices only show whether the Greek prices change relatively faster as compared to the foreign prices.[8]

For this reason, we consider an alternative measure of relative prices, namely the ratio of CPLs of Greece and the tourist generating countries. CPLs are calculated as a ratio of purchasing power parities for final consumption expenditure to exchange rates. In this way, they provide a direct measure of price levels differences between countries. The ratio of Greek to foreign CPLs, therefore, indicates whether Greece is relatively cheap/expensive compared to the foreign country.

Model (8) in Table 2 presents the estimation results for this new variable (COMPR). Similarly to the relative prices, the coefficient of comparative prices is not statistically significant at any level. Furthermore, model (8) shows that the inclusion of this new variable has no influence on the estimated effects of the past tourist arrivals, GDP, trade and distance. The coefficients of these variables remain largely unchanged in terms of their values and statistical significance throughout the various specifications. This suggests that the estimated effects are quite robust to the inclusion of CPLs in the model. Furthermore, the estimated results in model (8) are very similar in terms of magnitude, sign and significance to the results in model (1).

5 Concluding remarks and policy recommendations

This paper examines the main determinants of international tourism demand in Greece. Using data on tourist flows from 31 countries to Greece, the analysis shows that distance and trade ties between Greece and the sending countries are important factors influencing foreign demand for tourist services. In contrast to empirical studies of international tourism demand for other destinations, personal income of tourists does not appear statistically significant in each model. The relative prices and the proxy of infrastructure and other facilities are not statistically significant at any level, while the coefficient of political stability exhibits a positive effect on tourism. The estimated results show a mixed picture for the competitors of Greece in the market for international tourist services. The relative prices between Greece and Spain, Portugal, Italy and Croatia appear to be statistically insignificant predictors of tourism demand, while the corresponding coefficients for Turkey, Cyprus and Egypt do seem to significantly influence tourism in Greece. The 2004 Olympic Games in Athens had a negative effect on the international tourist arrivals in that year, a finding which seems to corroborate with similar findings for the recent London Olympics.

A major finding is that the demand for tourism in Greece does not appear to be a luxury service for the relatively rich (European) countries in our sample, neither in the short-run nor in the long-run. A policy recommendation in that respect is that the Greek tourist industry needs to pay more attention to attract visitors from fast growing large economies (e.g., Russia and China), where incomes rise rapidly and a holiday to Greece may still be a luxury service. Moreover, since distance appears to be one of the most important determinants of tourist demand in Greece, it might be beneficial for Greece to provide economical tour packages including the transportation costs in order to attract more visitors. Additionally, as trade ties is another essential determinant of tourism, Greece has to specifically improve its trade relationships with countries which are not yet well established clients of the Greek tourist product. Another point is the competitiveness

of the Greek tourism industry. Setting of competitive prices is a necessary condition to sustain and improve the position of Greek tourism in the global market. Furthermore, since external shocks such as political instability have a negative impact on foreign tourist demand, the strategies of policy makers should be focused on the mitigation of social unrest and massive strikes improving in this way the country's image abroad.

Future research needs to further investigate the income elasticity of different groups of sending countries, providing tourism policy with more focus. The empirical analysis in this paper can be further extended by using a proxy of marketing expenditures for tourism, which is not used in this analysis due to data unavailability, in order to capture the impact of the country's promotion of Greek tourism services. Finally, the use of an alternative proxy of supply factors and facilities, apart from investment spending in transport infrastructure, would be an interesting extension of this study.

Acknowledgements

We are very grateful to the editor and two anonymous reviewers for their excellent comments and suggestions. Panagiotis Chasapopoulos is grateful to the Faculty of Economics and Business Administration and Research Institute for Trade and Transaction Management (RITM) of VU University Amsterdam, where the major part of this research was conducted. Panagiotis Chasapopoulos also gratefully acknowledges financial support from the Flemish Science Foundation's (FWO) Odysseus programme.

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Notes

1 For applications of the gravity model in the tourism literature see Archibald et al. (2008), Leitao (2010), and Görmüs and Göçer (2010).

2 Albania, Australia, Austria, Belgium, Bulgaria, Canada, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Hungary, Ireland, Israel, Italy, Japan, Netherlands, Norway, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Spain, Sweden, Switzerland, Turkey, the UK, and the USA.

3 Other studies that use real GDP per capita to approximate living standards in tourist generating countries are Lathiras and Siriopoulos (1998), Song et al. (2003b), Naude and Saayman (2005) and Garín-Muñoz and Montero-Martin (2007).

4 We started first by estimating a static version of the model, applying both fixed and random effects methods. The Wooldridge test for autocorrelation (Ho: no first-order autocorrelation) detected, however, the presence of serial autocorrelation. Since autocorrelation could exist due to a model misspecification, the rest of the paper follows a dynamic estimation approach. The empirical results of the static model as well as the associated tests are available upon request.

The variables of the static models were tested also for unit roots (applying the Harris-Tzavalis, Levin-Lin-Chu, Breitung and Im-Pesaran-Shin tests). Although the different tests yielded different results, in each case some of the variables were found to be non-stationary. The test results are available upon request.

5 GMM estimator was developed and formalised by Hansen (1982). Since then it has been become one of major estimation methods in economics.

6 In order to reduce the bias coming from a large number of instruments we used only the second lag of the endogenous variables as an instrument.

7 It is more important to look at AR(2) in first differences, since it will detect serial correlation in levels.

8 Remember that the relative prices were calculated as the ratio of Greek to foreign CPIs adjusted by the exchange rate. CPIs, however, are used to measure changes in the price level of consumer goods and services over time. A CPI of 105 means that the prices have increased by 5% as compared to the base year. We do not know how high or low these prices are in comparison to other countries.